

What is claimed is:

1. A digital content downloading system using a network in which digital content possessed by a digital content retailer is downloaded to one of a plurality of consumers through a network, comprising:

a plurality of subscriber lines which each are formed of an optical fiber and are arranged between the consumers and the network managed by a network operator;

an optical line terminator, arranged on a side of the network, for terminating one subscriber line on the network side;

an optical network unit, arranged on a side of each consumer, for terminating one subscriber line on the consumer side;

a star coupler for connecting the subscriber lines terminated by the optical network units to the subscriber line terminated by the optical line terminator;

a resource reservation server for reserving a particular bandwidth for the digital content in the subscriber lines in response to a request by a particular consumer; and

downward bandwidth managing means, arranged in the optical line terminator, for controlling the downloading of the digital content from the digital content retailer to the optical network unit of the particular consumer to transmit the digital content through the subscriber lines and the star coupler at the particular bandwidth reserved by the resource reservation server.

2. A digital content downloading system using a network according to claim 1, wherein the particular bandwidth for

the digital content reserved in response to the request by the particular consumer by the resource reservation server is guaranteed in a shared bandwidth of the subscriber lines.

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3. A digital content downloading system using a network according to claim 1, wherein the particular bandwidth for the digital content reserved by the resource reservation server in response to the request by the particular consumer is guaranteed in a first signal having a wavelength differing from that of a second signal corresponding to a shared bandwidth of the subscriber lines.

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4. A digital content downloading system using a network according to claim 1, wherein the optical network unit arranged on the side of the particular consumer comprises:

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an optical wavelength demultiplexing unit for demultiplexing a multiplexed optical signal of a first wavelength transmitting through the subscriber line;

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a first optical receiving unit for receiving a plurality of optical signals of the first wavelength demultiplexed by the optical wavelength demultiplexing unit and converting the optical signals into a plurality of digital signals;

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a passive optical network processing unit for extracting data of the digital content from the digital signals obtained by the first optical receiving unit;

a plurality of interfaces, connected to a plurality of terminals in one-to-one correspondence, for respectively

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transmitting data matching with the corresponding terminal to the corresponding terminal; and

a destination judging and header processing unit for judging the destination of the data of the digital content extracted by the passive optical network processing unit to determine a particular terminal to which the data of the digital content is downloaded, performing a header processing for the data of the digital content to identify the content retailer, and transmitting the data of the digital content to the particular terminal through one interface corresponding to the particular terminal.

5. A digital content downloading system using a network according to claim 1, wherein the optical network unit arranged on the side of the particular consumer comprises:

an optical wavelength demultiplexing unit for demultiplexing a first multiplexed optical signal of a first wavelength transmitting through the subscriber line to a plurality of first optical signals of the first wavelength and demultiplexing a second multiplexed optical signal of a second wavelength transmitting through the subscriber line to a plurality of second optical signals of the second wavelength, the second multiplexed optical signal including data of the digital content of which the particular bandwidth is reserved by the resource reservation server;

a first optical receiving unit for receiving the first optical signals of the first wavelength from the optical wavelength demultiplexing unit and converting the first optical signals into a plurality of first digital signals;

5        a passive optical network processing unit for extracting  
the data of the digital content from the second digital  
signals obtained by the second optical receiving unit;

10 transmitting data matching with the corresponding  
terminal to the corresponding terminal; and

a destination judging and header processing unit for judging the destination of the data of the digital content extracted by the passive optical network processing unit to determine a particular terminal to which the data of the digital content is downloaded, performing a header processing for the data of the digital content to identify the content retailer, and transmitting the data of the digital content to the particular terminal through one interface corresponding to the particular terminal.

6. A digital content downloading system using a network according to claim 1, wherein the content retailer charges the particular consumer for the downloading of the digital content according to the particular bandwidth reserved by the resource reservation server, a time period used for the downloading or a time zone used for the downloading.

7. A digital content downloading system using a network  
30 according to claim 6, wherein information of charges

corresponding to a bandwidth used for the downloading of data including the digital content, a time period used for the downloading of data including the digital content or a time zone used for the downloading of data including the digital content is transmitted from the network operator to the consumers.

8. A digital content downloading system using a network according to claim 1, wherein the digital content is a music file, a video file or a game software title.

9. A digital content downloading system using a network in which digital content possessed by one of a plurality of content retailers is downloaded to a consumer through a network, comprising:

a plurality of subscriber lines which each are formed of an optical fiber and are arranged between the content retailers and the network managed by a network operator; an optical line terminator, arranged on a side of the network, for terminating one subscriber line on the network side;

an optical network unit, arranged on a side of each content retailer, for terminating one subscriber line on the content retailer side;

a star coupler for connecting the subscriber lines terminated by the optical network units to the subscriber line terminated by the optical line terminator;

a resource reservation server for reserving a particular bandwidth for the digital content in the subscriber lines for the downloading of the digital content to the consumer

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as a bandwidth reservation in response to a request by a particular content retailer;

upward bandwidth managing means, arranged in the optical line terminator, for receiving the bandwidth reservation  
5 from the resource reservation server; and

upward transmission control means, arranged in the optical network unit of a particular content retailer, for controlling the downloading of the digital content from the optical network unit of the particular content retailer  
10 to the consumer to transmit the digital content through the subscriber lines and the star coupler at the particular bandwidth according to the bandwidth reservation received from the upward bandwidth managing means.

15 10. A digital content downloading system using a network according to claim 9, wherein the particular bandwidth for the digital content reserved in response to the request by the particular content retailer by the resource reservation server is guaranteed in a shared bandwidth of  
20 the subscriber lines.

11. A digital content downloading system using a network according to claim 9, wherein the particular bandwidth for the digital content reserved by the resource reservation  
25 server in response to the request by the particular content retailer is guaranteed in a first signal having a wavelength differing from that of a second signal corresponding to a shared bandwidth of the subscriber lines.

12. A digital content downloading system using a network according to claim 9, wherein the optical network unit arranged on the side of the particular content retailer, comprising:

5 an interface for receiving data of the digital content from an external terminal;

a quality-of-service control unit for controlling the transmission of the data of the digital content received in the interface according to the bandwidth reservation  
10 received by the upward transmission control means;

a passive optical network processing unit for controlling a transmission timing of the data of the digital content, of which the transmission is controlled in the  
15 quality-of-service control unit, to prevent the interference of the data of the digital content with data transmitted from the other optical network units;

a first optical transmitting unit for converting the data of the digital content, of which the transmission timing is controlled in the passive optical network processing  
20 unit, into a plurality of optical signals having a first wavelength and transmitting the optical signals; and

an optical wavelength multiplexing unit for multiplexing the optical signals transmitted from the first optical transmitting unit to a multiplexed optical signal and  
25 outputting the multiplexed optical signal to the corresponding subscriber line.

13. A digital content downloading system using a network according to claim 9, wherein the optical network unit  
30 arranged on the side of the particular content retailer,

an interface for receiving first data and second data of the digital content from an external terminal;

5. transmission of the first data and controlling the transmission of the second data of the digital content received in the interface according to the bandwidth reservation received by the upward transmission control means;

10 a passive optical network processing unit for controlling  
transmission timings of the first data and the second data  
of the digital content, of which the transmission is  
controlled in the quality-of-service control unit, to  
prevent the interference of the first data and the second  
15 data of the digital content with data transmitted from the  
other optical network units;

a first optical transmitting unit for converting the first data, of which the transmission timing is controlled in the passive optical network processing unit, into a plurality of first optical signals having a first wavelength and transmitting the first optical signals;

a second optical transmitting unit for converting the data of the digital content, of which the transmission timing is controlled in the passive optical network processing unit, into a plurality of second optical signals having a second wavelength differing from the first wavelength and transmitting the second optical signals; and

an optical wavelength multiplexing unit for multiplexing  
30 the first optical signals transmitted from the first



optical transmitting unit to a first multiplexed optical signal, multiplexing the second optical signals transmitted from the second optical transmitting unit to a second multiplexed optical signal, and outputting the first multiplexed optical signal and the second multiplexed optical signal to the corresponding subscriber line.

14. A digital content downloading system using a network according to claim 9, wherein the network operator charges the particular content retailer for the downloading of the digital content according to the particular bandwidth reserved by the resource reservation server, a time period used for the downloading or a time zone used for the downloading.

15. A digital content downloading system using a network according to claim 14, wherein information of charges corresponding to a bandwidth used for the downloading of data including the digital content, a time period used for the downloading of data including the digital content or a time zone used for the downloading of data including the digital content is transmitted from the network operator to the content retailers.

16. A digital content downloading system using a network according to claim 9, wherein the digital content is a music file, a video file or a game software title.